



**RESPONSE TO DOCUMENT AIP/SEM/06/05**

**The Single Electricity Market (SEM)**  
Proposed High Level Design

Submitted by: **Sustainable Energy Ireland**

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*...Regarding the two major international risks – oil prices and uncertainty surrounding exchange rates - the continuing relative strength of the international economy, although softening in some regions, may result in oil prices remaining high...*

- Central Bank and Financial Services Authority of Ireland (5/2005)

## **1. PREAMBLE**

SEI welcomes the opportunity to respond to the NIAER and CER recent document on the Single Electricity Market (SEM) (AIP/SEM/06/05), which outlines the high level proposal for the all-island wholesale electricity market. It is important to note that this market design, which appears to be unique in the world, will inevitably require adjustment and therefore built in flexibility in its design to allow for and accommodate unforeseen developments and circumstances. Inevitably, the issue of dominance, and the regulatory response to it, will impact the market in more significant ways than many of the design principles.

This response does not adhere to the structure of the SEM consultation document.

## **2. INTRODUCTION**

SEI has submitted comments at a number of different stages of the design of the CER's MAE. SEI has also participated on varied expert and steering groups and has contributed in the course of their deliberations. In many respects the comments SEI submitted and voiced remain valid, in as much as a mandatory pool market is again being recommended. There are of course considerable differences in the proposals for treating capacity payments, transmission losses, congestion, and settlement in the SEM. However, it will be important not to unduly discount the considerable dialogue undertaken as part of the MAE process, nor the education that it facilitated in the wider energy community. It is also important to note that issues addressed in the AIP paper will be directly affected by not only economic and circuit theory, but by regulation of the dominant player(s) and government policy.

The measures of success of an electricity market are difficult to define and measure. This has been true in all electricity markets that have moved from one structure to a more "competitive and transparent" one. Inevitably the SEM will also encounter this issue. A number of questions are likely to emerge: Did prices go down? For whom? Why? What are the costs and benefits? How are they defined? To whom do they accrue? Because of the difficulty of appraising success it is critical to introduce, at an early stage, metrics that are aligned with the goals of the project. SEI would emphasise that focusing primarily on lower electricity costs to consumers as the dominant goal or metric, is neither sound nor viable. This position is reaffirmed in the policy document on the All-Island Energy Market Framework and in the SEM document through reference to sustainability.

*Renewable energy is expected to contribute 13.2% of gross electricity consumption in Ireland by the end of the decade. It will then likely continue to increase its contribution with the implication that it will become a "mainstream" part of the generating portfolio of the island in the term of the proposed market structure. The electricity market will be critical in incentivising this*

*continued growth and supporting it (as well as CHP<sup>1</sup> and distributed generation). Likewise the stimulation of a robust demand response should likewise be facilitated by market rules and operation. Both of these should become explicit goals for the design of the electricity market and be reflected in the detailed rules. They are not simply “environmental” issues, but intimately tied to security of supply, competitiveness, and are central to energy policy goals. As the market will continue to evolve over time (as all other electricity markets internationally have done), it will be crucial to maintain this type of underlying philosophy in keeping with the spirit of the various EU Directives, Government policy the Regulators’ statutory responsibilities, and within the All-island framework.*

SEI’s interests and remit related to electricity market are in the areas of:

- Renewable energy
- Energy efficiency
- CHP and distributed generation
- Greenhouse gases
- Transboundary air pollution
- Sustainable energy R&D

It is in the interest of all participants that the market design be robust over time and promote operational clarity. SEI looks forward to working with the CER and NIAER and other interested parties in furthering the necessary research and informing the policy to reflect and the needs of and opportunities for both the RE technologies, energy efficiency, market participants, to the benefit of electricity customers.

### **3. ALL-ISLAND FRAMEWORK**

The Framework for the All-island Energy Market states that it should, “...provide for competitive, sustainable and reliable markets in electricity and natural gas on the island of Ireland at the minimum cost necessary.” The context for the framework is given as the, “...European Union’s (EU) single market for electricity and natural gas and the growth of regional energy markets.” Thus, it is inevitable as part of this process that future consideration should be given to the wider and developing European regional context of the island of Ireland and Great Britain.

The dialogue that the AIP team appears to be committed to will need to be maintained going forward to ensure that the complexities surrounding the formation of a wholesale spot market in Ireland are captured and reflected in the design.

### **4. GENERAL COMMENTS**

The impetus for electricity (and indeed energy) market liberalisation in Ireland stems, *inter alia*, from the commitment stated under section 9(1)a of the 1999 Electricity Regulation Act (as well as the EC directive on Common Rules for the Internal Electricity Market (96/92/EC)). The Act calls for the introduction of an, “appropriate wholesale market...applying to all bulk electricity generation and supply”. A mandatory gross pool market is (again) being considered.

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<sup>1</sup> The CHP Policy Group has been liaising with the CER on a number of areas related to the electricity market rules. These issues should be recognised in the detailed rules development.

The type of market proposed (gross pool) should offer RE generators a guaranteed market for energy. It will eliminate the necessity of an asymmetric top-up and spill regime, and allow for price transparency (provided the requisite data is released). However, there will still need to be research undertaken to explicitly address the detail of how RE plants are dispatched, ancillary services are secured by payments (or other treatment), the exact role and incentivisation of DSM, pricing for non-dispatchable generators, and the use of financial hedging tools. The high level treatment of RE appears appropriate and is based on lessons garnered from past MAE consultations and decisions (at least in part). The details remain to be outlined and tested.

Ideally the market will evolve into one with sufficient liquidity to ensure competition in the spot, ancillary services, and derivative markets. In this way the stochastic nature of some RE resources can be addressed on various temporal bases and hedged appropriately.

Outhred (2002) has identified some issues germane to RE and energy efficiency in an electricity market. He notes that there are some fundamental issues at a macro-scale that will need to be remedied before the process of specific definitions can be approached reliably.

*The introduction of large amounts of non-dispatchable generation would require the abandonment of the assumption that short-term industry operation can be formulated as a supply-side problem that relies solely on dispatchable generation.*

It is worth highlighting that various RE technologies (wind, wave, biomass, solar) have widely varying operational characteristics. CHP plants, likewise, have unique operational attributes that vary according to on-site (heat) loads, scale, and technology. Finally distributed generation, may well include a number of different generator types (fuel cells, gas turbines, reciprocating engines, etc.) utilising an array of input fuel options (both fossil-fuels and RE). This diversity will need to be addressed in the formation of market design.

In practice there is very little empirical data or experience with RE intermittent generators participation in gross pool electricity markets. They have, in the main, either opted for policy mechanisms that place them outside the scope of market participation, or have been granted non-dispatchable or must-run status. While the issue of the treatment of intermittent generation is, for now, at the margin of the market development and design, it should be thought through carefully so as to ensure the overall robustness and maintain the clarity that will be demanded of the new market for electricity<sup>2</sup>.

Again, there will be significant resort to regulatory measures due to the dominance issues in the SEM. Indeed, as was the case during the discussions on the MAE, this topic and its associated responses will have a critical bearing on all other aspects of the market, including price, new entry, emissions, etc. It is best decided in a holistic manner within the market design process.

## **5. MODELLING**

This response serves to highlight the need for a good understanding supported by detailed investigation of the areas referred to by the AIP together with those areas found to be of significance in other markets. Such investigation will need to have recourse to analytical work in

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<sup>2</sup> It is also worth mentioning that SEI recognises that the AIP is currently working on the high-level design phase prior to commencement of a detailed implementation phase where the detailed solutions to questions and comments posed here will be given due consideration.

both economics and electrical engineering that recognises the specifics of the market structure and the unique features of the Irish electricity landscape.

This imperative is emphasized by Hirst (2001 pg. 39):

*The key lesson to be learned ... is that it is feasible and practical to calculate the costs and revenues ... It is not necessary—and certainly not desirable—to estimate these costs and payments based on speculation and ideology.*

It is also echoed by references in a 2003 CER report (Commission for Energy Regulation/OFREG NI Document No 3096/GR/04, 2003).

*With the possible exception of NETA, Regulators appear to have taken a pragmatic approach to anticipated difficulties, rather than applying rigorous economic tests.*

In many of the categories described by the AIP reasonable predictions of outcomes will only be possible by having recourse to modeling, simulation, and analysis<sup>3</sup>. In this regard, the public dissemination of generation data for PLEXOS is an essential part of the AIP. The analysis should be informed by international experience but not limited to it, given its relative uniqueness. The (apparent) complete abandonment of providing system data for modelling purposes does not seem to be the most appropriate way to handle the situation faced by the two regulators in obtaining generator data (AIP document 29/4/2005).

Market participants, given the vast bulk of data is potentially available (i.e. agreed to be made public), could utilise their own skills and experience to model the other generators (who would not agree). Modelling and simulation are of course not only reliant on data provision, but on skill and experience as well. Acknowledging failure to provide data at this stage seems less than an ideal way to handle the need for transparency in the new all-island market. Is there no way to provide the data that was supposed to be made public? It would appear in the best interests of the transparent market design process to facilitate (make it a condition of participating in the market as an example) the provision of this data in a timely manner. It would signal that the AIP team's committed to data provision throughout the process.

Significantly, in 2003 and 2004, SEI undertook and initiated action to analyse and model the CER's proposed MAE in relation to RE and CHP. This was the first publicly available rigorous economic modelling work undertaken of the full Irish market (all nodes, AC power flow, etc.). That study remains an appropriate source of information for the AIP team's deliberation. (It is available on our web site).

The study investigated the impacts of various market design choices on intermittent and unpredictable (non-dispatchable) energy generation was investigated. It included detailed technical, economic, financial, and regulatory analysis. The resulting deliverable increased the understanding of the impacts of market design on the economic and (to some extent) operational viability of wind energy and other RE (biomass CHP, landfill gas, etc.) production in the Republic of Ireland.

Henwood's latest software product MARKETSYM LMP<sup>TM</sup> was utilized in the project. It's a state-of-the-art economic model that simultaneously forecasts marginal energy and operating reserve prices in deregulated markets under a wide range of market structures (including LMP).

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<sup>3</sup> It is acknowledged that they still may be wrong!

MARKETSYM LMP™ is able to forecast electricity energy prices at each injection and take-off point on a half-hourly basis. It has the capability to perform AC and DC OPF analysis. Henwood's model uses its unit commitment and simulation engine to develop zonal pool prices, generation commitment and availability, generator cost curves and dynamic limits, and dispatch and interconnector flows for each period. These are then mapped to the nodal transmission model to take into account of congestion and losses on the system, so as to amend the dispatch schedules and generate LMPs. The tool is used worldwide, including in the Irish EPUS market. MARKETSYM LMP minimises cost, and accounts for realistic equality and inequality constraints. It is based on regional model including NI. Again, the results are available on our web site and should prove useful to the AIP team during their deliberations.

## Other Topics

Some issues are raised briefly in the following paragraphs and these are provided as an indicative sub-set of a wide variety of questions still remaining.

- Although it appears clear and while it is simple to state that a “causer-pays” principle will be utilised for charging for reserves (and perhaps ancillary services as well?) there are inevitable complexities. There is very little research being conducted in Ireland about exactly how to do this or what costs should be attributed<sup>4</sup>. Indeed, even the quantification of the amount of reserves (in varying categories) is difficult to determine. (SEI's reserve study (available on the web) is a good starting point for this in relation to wind energy.)
- The price chosen for VoLL has affected market prices in other similar pool markets. Should it be asymmetric? Does it matter to RE? How will it be calculated?<sup>5</sup>
- The treatment of distributed connected generation will also require research. At the very least it will require a further market analysis of DG and likely future implementation. In that way minimum and maximum limits can be set with some confidence and relevance. Various behavioral incentives will be implicit in the rules. Will they serve to optimize (or support) current network and grid constraints?
- To properly hedge against fluctuating prices generators will need to utilize financially hedging instruments like CfD's. This will require sufficient liquidity in the market to ensure counter-parties. Liquidity in this type of market is not necessarily a given and is not apparent even in more mature electricity markets. Who are the counter-parties that are willing to take the risk? Will they be available in the short-term?
- Not only spot market design, but day-ahead issues, software details, and forward markets will need to be considered in depth.
- The exact specifications for RE forecasting will need to be considered.
- There are other interpretations of priority dispatch. The one chosen seems reasonable and is utilised by the UK. It is not a simple concept or a terribly well defined one however, and its use in the market should recognise this.

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<sup>4</sup> Similar difficulties are encountered in most of the topics mentioned.

<sup>5</sup> The UK figure is supposedly based on some studies that date back decades. The methodologies employed for calculating VoLL are numerous and vary widely (by an order of magnitude). There are temporal and sectoral issues that are not easy to average. It is a useful construct for the market, but its limitations needs to be recognized explicitly.

- The choice of a 5MW *de minimus* level for market participation is not entirely objectively based. It appears to stem from the MAE rules, and should be revisited in the SEM and not assumed to be appropriate.
- The area of demand participation is of course not wholly addressed in any current electricity market, but should be recognised as an area for continued improvement and dialogue.
- Interconnection. Further study required on impacts, will relate to technology and regulatory and fiscal rules in detail. Timing and quantities are of paramount importance.
- The treatment of emissions treatment in the document was, at best, cursory. Considerable further detail will be required to investigate how costs are regulated if at all

There are a large variety of such questions. They need to be identified first, addressed individually and resolved holistically.

## **2. FINAL REMARKS**

SEI is committed to supporting work on the development of electricity market where it is appropriate and relevant to its mission. SEI shaped its electricity market study in consultation with CER to help inform market design (in the MAE) There is still need for PLEXOS and its public data sets for analysing the impacts of detailed design decisions, and permit industry to simulate the market conditions.

SEI is committed to resourcing any AIP expert and implementation groups relating to areas within its remit. SEI has previously provided training on economic dispatch modelling for some CER staff, and would be pleased to support the NAIER.

The regulatory necessities of the electricity market inevitably introduce economic inefficiencies. If these inefficiencies are to be minimised, they need to be properly defined, identified, analysed, and placed in a wider cost and benefit context for consideration ahead of decision.

The exact market structure being proposed is not a replica of any precedent that SEI is aware of. This is significant in itself. It should be acknowledged to be complex task. In this acknowledgement there should be provided the ability to design flexibility into the market rules. Certainly there will be opportunities for learning and optimisation over the next decade and beyond.

SEI looks forward to working with the AIP team and other interested parties in furthering the research necessary to inform the implementation of a policy that reflects the interests of RE technologies, energy efficiency, CHP and DG, market participants, and meets the needs of electricity customers.